DOCUMENT RESUME

ED 108 615 IR 002 131

AUTHOR	Foote, Thomas
TITLE	Weekly Log Record Sort (WLSORT).
INSTITUTION	Southwest Regional Laboratory for Educational Research and Development, Los Alamitos, Calif.
REPORT NO	SWRL-TN-5-72-14
PUB DATE	21 Mar 72
NOTE	20p.
EDRS PRICE	MF-$0.76 HC-$1.58 PLUS POSTAGE
DESCRIPTORS	Communication Skills; *Computer Programs; *Data Processing; Electronic Data Processing; Flow Charts; Information Processing; Information Storage; *Management Systems; Recordkeeping; *Student Records; Systems Development
IDENTIFIERS	*Computer Software Documentation; FORTRAN V; Sort Routines

ABSTRACT

Computer routines to sort the weekly log records submitted by teachers participating in the Southwest Regional Laboratory's communications skills monitoring program are described. Written in Univac FORTRAN V, Weekly Log Record Sort (WLSORT) sorts log records on magnetic tape to enable subsequent computer programs to interpret the input data by district, school, and classroom. This document is intended to serve as the softward documentation for the programs. Included are a program description, data format specifications, program constraints and limitations, and operating instructions. Program flowcharts, program listings, and sample data forms are also provided. (DGC)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

IR

SWRL

SOUTHWEST REGIONAL LABORATORY
TECHNICAL NOTE

DATE: March 21, 1972

NO: TN 5-72-14

TITLE: WEEKLY LOG RECORD SORT (WLSORT)

AUTHOR: Tom Foote

ABSTRACT

WLSORT sorts CS-1 weekly log records located on magnetic tape to enable the new weekly log processor program CS-1-WLSR1, (TN 5-72-15) to interpret all data in terms of classes rather than groups.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

This document is intended for internal staff distribution and use. Permission to reprint or quote from this working document, wholly or in part, should be obtained from SWRL, 11300 La Cienega Boulevard, Inglewood, California, 9030.

ER 006 131

WEEKLY LOG RECORD SORT (WLSORT)

1.0 - PROGRAM IDENTIFICATION

WLSORT*

2.0 - OBJECTIVE

Weekly Log records written on magnetic tape in order of district, school, teacher, class, group, month, and day, must be re-sorted in order of district, school, teacher, class, month, day, and group (i.e., shift of the last three fields only) to enable the program CS-1-WLSR1 to interpret all data in terms of classes rather than groups.

3.0 - PROGRAM DESCRIPTION

3.1 - Program Logic

WLSORT reads one weekly log record at a time from magnetic tape, calculates its record identification value (i.e., the value that will be sorted on) according to the month, day, and group read for each record, and assigns a corresponding index value (i.e., the value that will point to that record for output) according to the order in which each record is read. Exit from this loop is triggered by either (1) a device error, (2) a transmission abort, (3) a class containing more than 240 records, (4) an end-of-file read on the input tape, or (5) a record containing a new class identification number. Cases 4 and 5 are considered to be the normal exits, indicating that all records for a class have been properly read and are waiting to be sorted. After exiting the read-a-record loop, and before calling SUBROUTINE SORT, the record containing the new class identification number is stored and labeled as the first record of the next class (whose following records are yet to be read). Ignoring this latest record (which belongs to the next class) and supplied with the last class' array of record ID's and corresponding index values, SUBROUTINE SORT rearranges the record ID's in ascending order (using a bubble sort) and concurrently moves their corresponding index values.

The first value returned in the rearranged index array then directs the output loop to write onto tape, the record with the smallest record ID; the second index value triggers writing of the record with the next smallest record ID, and so on until all records for that class have been written. If a class once sorted on an output tape is not the last class on the input tape, the program returns to continue reading the next class. The program

---

*WLSORT is an adaptation of CS-1-Weekly Log Sort (TN 5-71-15).

terminates once the read-a-class/sort-a-class cycle is completed for all classes.

3.2 - Variables

All variables in this program are of integer type. The value of the subscript KOUNT corresponds to a selected record within the current class and all arrays subscripted by KOUNT are dimensioned to 240.

IALPHA (KOUNT, L), INTEGER ALPHA. This array (dimension 240 by 40) contains all the ALPHA data read from one weekly log record.

ICLASS (KOUNT), INTEGER CLASS. This two-digit value identifies the class to which a given weekly log record belongs.

IDAY (KOUNT), INTEGER DAY. This two-digit value identifies the day (range 1 to 31) on which the weekly log sheet was dated.

IDST (KOUNT), INTEGER DISTRICT, SCHOOL, AND TEACHER. This six-digit value identifies the district, school, and teacher to which a particular log record belongs.

IGROUP (KOUNT), INTEGER GROUP. This single-digit value identifies the group to which a particular weekly log record belongs.

IMDG (KOUNT), INTEGER MONTH, DAY, AND GROUP. This array of record identification values is computed for each record by concatenating the values IMONTH, IDAY, and IGROUP, e.g., IMONTH = 10, IDAY = 30, IGROUP = 2 yields IMDG = 10302. Once computed for each record within a class, these record ID's are passed to SUBROUTINE SORT and rearranged in ascending order.

IMONTH (KOUNT), INTEGER MONTH. This two-digit value identifies the month (July = 1, August = 2 . . . June = 12) in which data on a given sheet was recorded.

INIT, INITIAL VALUE. As the initial value of the main read loop INIT is set to 1 for the first record of the first class read. For subsequent classes, however, INIT is set to 2 to account for the new class record which marked the end of the old class' read loop (i.e., that record which waits in array position 1 of the new class array about to be read).

KEY (KOUNT), KEY ARRAY. This index array is stored with each counter value of the read loop's DO variable KOUNT, i.e., integers 1, 2, 3, . . . NRECS, originally in that order. SUBROUTINE SORT then rearranges this array by allowing each of the array values to follow their corresponding values of the record ID array

(IMDG) as the IMDG array is sorted. The first value in the rearranged index array KEY then directs the output loop to write the record with the smallest IMDG index value, while the second KEY value triggers writing of the record with the next smallest IMDG index value, and so on.

KOUNT, KOUNTER VALUE. This DO variable for the read loop counts the records being read for a class. In addition to serving as a subscript for each record, each KOUNT value is immediately stored into the KEY array as described in the "KEY (KOUNT)" definition above.

KOUNT2, 2nd KOUNTER VALUE. To avoid alteration of a DO variable outside its respective loop, KOUNT is renamed KOUNT2 upon exit of the read loop in order to compute LESONE. LESONE is the argument passed to SUBROUTINE SORT, which indicates the total number of records to be sorted.

LESONE, LESS ONE. This value equals the number of records read, minus one. By purposely ignoring the last record read, i.e., the record with the discrepant class number, this subtraction yields the exact count of records to be sorted for the preceding class and is thereby used as the third argument passed to SUBROUTINE SORT.

LOGREC(L), WEEKLY LOG RECORD. As the array containing all alpha and numeric data on a weekly log record, this serves as a major argument to be passed to the read/write subroutine NTRAN.

LSTAT, STATUS VALUE. This value indicates the status of NTRAN. The LSTAT status codes are as follows for read and write operations:

-1 indicates transmission not complete
-2 indicates end-of-tape (indicates end-of-file in write operations)
-3 indicates device error
-4 indicates transmission aborted

NO MORE, NO MORE. This flag is either set to 1 or 0 to indicate whether "no more" classes remain to be sorted.

NO SUB, Number of the SUBscript. This subscript value identifies the weekly log record currently being printed. Since the compiler will not permit the use of nested subscripts e.g., IMONTH(KEY(J)), the current KEY(J) value is restored as NOSUB, which in turn is used as the subscript for writing the elements of the newly sorted record.

4.0 - SUBROUTINES AND FUNCTIONS

4.1 - SUBROUTINE SORT (SORTON, FOLLOW, NRECS) sorts the array SORTON (using an ascending bubble sort) while rearranging the array FOLLOW. In turn FOLLOW is employed to fetch and write records in their sorted order.

Argument Description

FOLLOW(NREC), FOLLOW the SORTON elements. This integer array enters the subroutine, containing numbers 1, 2, 3, . . . NRECS, in that order. As out-of-order record ID's are shifted into order, their corresponding elements in the FOLLOW array are also shifted. FOLLOW is finally returned with its elements rearranged, and is used by the main program to fetch and write the records in their new sorted order.

SORTON(NREC), SORT ON this array. The record identification numbers within this array are examined with respect to their order (i.e., relative to their immediate neighbors) within this array so as to trigger sort operations necessary to rearrange them in ascending order.

NRECS, NUMBER OF RECORDS. As the third argument in the subroutine list, this integer value indicates the number of record ID's to be sorted.

4.2 - SUBROUTINE NTRAN (UNIT, READ/WRITE CODE, BLOCK LENGTH, BLOCK NAME, STATUS VALUE). This library routine acts in conjunction with subroutines ENCODE and DECODE to read and write formatted records with lengths greater than those handled by the standard FORTRAN READ/WRITE statements.

5.0 - DATA SPECIFICATIONS

5.1 - Input Formats

Each record has been preprocessed from the raw weekly log scanner data, and appears on the input tape in order of district, school, teacher, class, group, month, and day. The record format then corresponds to the optical scan sheet format (see Appendix A), although irrelevant blanks have been deleted. As the following read sequence shows, each record contains: 1) IALPHA, the array of 238 alpha character responses; 2) IDST, the 6 digit integer identifying the district, school, and teacher; 3) ICLASS, the 2 digit integer identifying the class; 4) IGROUP, the 1 digit integer identifying the group; 5) IMONTH and IDAY, the 2 digit integers identifying the month and day respectively; and 6) IUNIT, the 10 digit

integer indicating the units to which the record pertains. These values are read in according to the following format:

```
      READ (31,200)  (IALPHA(KOUNT,L),L=1,40), IDST(KOUNT),
     +     ICLASS(KOUNT), (GROUP(KOUNT), IMONTH(KOUNT), IDAY(KOUNT),
     +     IUNIT(KOUNT)
  200 FORMAT(22A6/17A6,A4,I6,I2,I1,I2,I2,I10, 3X)
```

An example of records conforming to this format appears in Appendix B.

5.2 - Output Formats

Each record will be written on the output tape in order of district, school, teacher, class, month, day, and group. The contents of each record will be rearranged as IGROUP is shifted as indicated below:

```
      WRITE (31,500) (IALPHA(NOSUB,K),K=1,40), IDST(NOSUB),
     +     ICLASS(NOSUB),IMONTH(NOSUB),IDAY(NOSUB),IGROUP(NOSUB),
     +     IUNIT(NOSUB)
  500 FORMAT(22A6/17A6,A4,I6,I2,I2,I2,I1,I10,3X)
```

An example of records conforming to this format appears in Appendix C.

6.0 - PROGRAM CONSTRAINTS AND LIMITATIONS

6.1 - Programming Language

Univac 1108 FORTRAN V

6.2 - Vendor

University Computing Company

6.3 - Storage Requirements

7210 octal words

6.4 - Hardware Configuration

Univac 1108 (EXEC 2), card reader, 2 magnetic tape units and printer

6.5 - Program Parameters

Number of records per class should not exceed 240 unless array dimensions and loop limits are expanded beforehand.

6.6 - Error Messages

If the number of records per class exceeds 240, the program prints the following message before terminating all processing:
ERROR . . . NUMBER OF RECORDS FOR THIS CLASS EXCEEDS DO LOOP LIMIT OF 240.

If an end-of-tape marker is encountered in the write sequence, the program prints the following message before terminating all processing:
WRITE ERROR I.E., . . .
ERRORS IN TAPE OR TRANSMISSION ON RECORD ID NUMBER (DSTCGMD) = 01 02 01 01 1 4 1 (i.e., the identification number of the record in question)

7.0 - OPERATING INSTRUCTIONS

At UCC, the program was run with the following control card configuration:

```
@ RUN,W FOOTE,LS3512,3,150
@ MSG DELIVER JOB TO SWRL
@RAKEX ASG H=1343 RINGIN
@RAKEX ASG F=1035 NORING
@ FOR DECK1,DECK1

        Main Program (see listing, section 9.0)

@ FOR DECK2,DECK2

        SUBROUTINE SORT

@ XQT DECK1
@ XQT TUTIL (TUTIL is a write-to-tape routine, local to UCC)
REWIND H
PRINT H 20 RECS
REWINT F
REWINT H
```

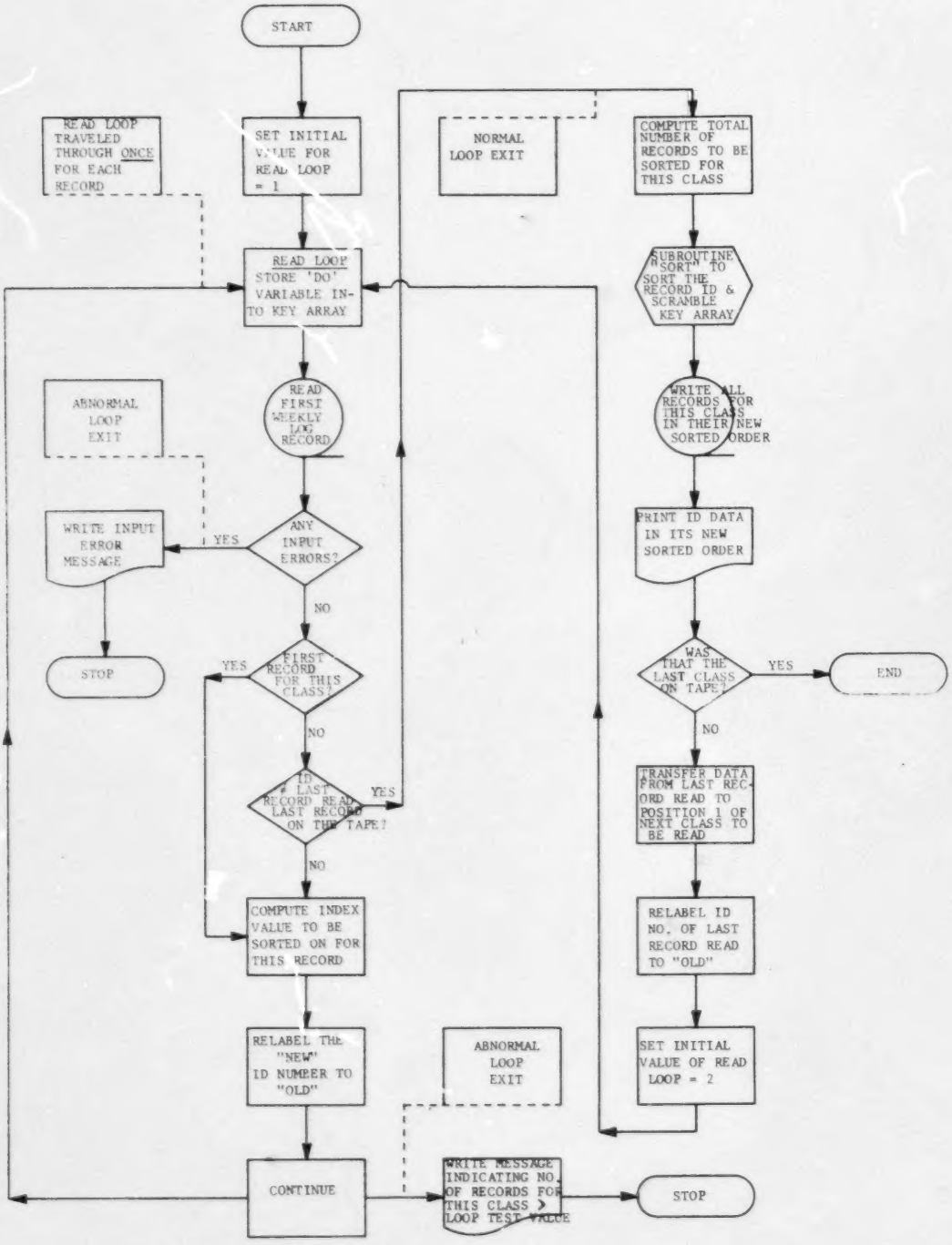
8.0 - PROGRAM FLOWCHART

SWRI

FLOWCHART LAYOUT FORM

PROGRAMMER: Tom Foote DATE: _____

PROGRAM ID: WLSORT PAGE 1 OF 1


START
SET INITIAL VALUE FOR READ LOOP = 1
READ LOOP TRAVELED THROUGH ONCE FOR EACH RECORD
READ LOOP STORE 'DO' VARIABLE INTO KEY ARRAY
READ FIRST WEEKLY LOG RECORD
ABNORMAL LOOP EXIT
WRITE INPUT ERROR MESSAGE
ANY INPUT ERRORS?
YES
NO
STOP
FIRST RECORD FOR THIS CLASS?
YES
NO
ID # LAST RECORD READ, LAST RECORD ON THE TAPE?
YES
NO
COMPUTE INDEX VALUE TO BE SORTED ON FOR THIS RECORD
RELABEL THE "NEW" ID NUMBER TO "OLD"
CONTINUE
NORMAL LOOP EXIT
COMPUTE TOTAL NUMBER OF RECORDS TO BE SORTED FOR THIS CLASS
SUBROUTINE "SORT" TO SORT THE RECORD ID & SCRAMBLE KEY ARRAY
WRITE ALL RECORDS FOR THIS CLASS IN THEIR NEW SORTED ORDER
PRINT ID DATA IN ITS NEW SORTED ORDER
WAS THAT THE LAST CLASS ON TAPE?
YES
END
NO
TRANSFER DATA FROM LAST RECORD READ TO POSITION 1 OF NEXT CLASS TO BE READ
RELABEL ID NO. OF LAST RECORD READ TO "OLD"
SET INITIAL VALUE OF READ LOOP = 2
ABNORMAL LOOP EXIT
WRITE MESSAGE INDICATING NO. OF RECORDS FOR THIS CLASS > LOOP TEST VALUE
STOP

9.0 - PROGRAM LISTING

```
C******WLSORT SORTS WEEKLY LOG RECORDS IN ORDER OF DISTRICT,SCHOOL,
C*****,TEACHER,CLASS,MONTH, DAY, AND GROUP.*********************
      COMMON LOGREC(44), IDST(240),ICLASS(240),
     +IGROUP(240),IMONTH(240),IDAY(240),IUNIT(240),
     +IMDG(240),IALPHA(240,40),KEY(240)
      NOMORE=0
      INIT=1
C  THE FOLLOWING LOOP READS ONE WEEKLY LOG RECORD AT A TIME.
C  EXIT FROM THE READ LOOP IS CAUSED BY 1)DEVICE ERROR,
C  2) TRANSMISSION ABORT, 3) NUMBER OF RECORDS/CLASS GREATER
C  THAN 240, 4)EOF READ ON INPUT TAPE, OR 5) ENCOUNTER OF LOG
C  RECORD BELONGING TO A DISCREPANT ID NUMBER(USUALLY A NEW CLASS).
C  CASES 4 AND 5 ARE CONSIDERED TO BE THE NORMAL EXITS.
   40     DO 99 KOUNT=INIT,240
          KOUNT2=KOUNT
          KEY(KOUNT)=KOUNT
          CALL NTRAN(4,2,44,LOGREC,LSTAT)
  100     IF(LSTAT.EQ.-1) GO TO 100
C         EXIT CASE 4, EOF READ
          IF (LSTAT.EQ.-2) GO TO 101
C         EXIT CASES 1 OR 2, DEVICE ERROR OR TRANSMISSION ABORT
          IF(LSTAT.EQ.-3.OR.LSTAT.EQ.-4) GO TO 102
          CALL DECODE(LOGREC,132)
          READ(31,200) (IALPHA(KOUNT,L),L=1,40),IDST(KOUNT),
     +    ICLASS(KOUNT),IGROUP(KOUNT),IMONTH(KOUNT),IDAY(KOUNT),
     +    IUNIT(KOUNT)
  200     FORMAT(22A6/17A6,A4,I6,I2,I1,I2,I2,I10,3X)
          IGROUP(KOUNT)=IABS(IGROUP(KOUNT))
          WRITE(6,205) IDST(KOUNT),ICLASS(KOUNT),IGROUP(KOUNT),
     +    IMONTH(KOUNT),IDAY(KOUNT),IUNIT(KOUNT)
  205     FORMAT(I8,I4,I2,I4,I4,4X,I10)
          IF(KOUNT.EQ.1) GO TO 210
C         IF THIS IS THE INITIAL PASS THROUGH THE LOOP FOR THIS CLASS,
C         BYPASS THIS CHECK FOR A CHANGE IN CLASS.
          IF (ICLASS(KOUNT).NE.IOLDCL.OR.IDST(KOUNT).NE.IOLDST)
     +    GO TO 400
C         COMBINE THE MONTH, DAY, AND GROUP VALUES READ FOR THIS CLASS
C         RECORD INTO THE MORE READILY SORTABLE INDEX VALUE IMDG
  210     IMDG(KOUNT)=IMONTH(KOUNT)*1000+IDAY(KOUNT)*10+IGROUP(KOUNT)
          IOLDCL=ICLASS(KOUNT)
          IOLDST=IDST(KOUNT)
   99     CONTINUE
C     EXIT CASE 3, NUMBER OF RECORDS/CLASS GREATER THAN 240
      WRITE(6,220)
  220 FORMAT(' ERROR...NO.OF RECORDS FOR THIS CLASS EXCEEDS DO
     + LOOP LIMIT OF 240')
      STOP
C     PREPARE TO SORT ALL RECORDS WITHIN THE PRECEEDING CLASS, NEGLECTING
C     THE RECORD LAST READ
  400 LESONE=KOUNT2-1
      CALL SORT(IMDG,KEY,LESONE)
```

```
C  BY LOOKING AT THE SCRAMBLED KEY ARRAY, THE FOLLOWING LOOP
C  FETCHES AND WRITES ONE WEEKLY LOG RECORD AT A TIME, IN
C  ITS NEW SORTED ORDER.
         DO 300 J=1,LESONE
         NOSUB=KEY(J)
         WRITE(6,206) IDST(NOSUB),ICLASS(NOSUB),
     +   IMONTH(NOSUB),IDAY(NOSUB),IGROUP(NOSUB),IUNIT(NOSUB),
     +   IMDG(J),KEY(J)
 206     FORMAT(I8,I4,I4,I4,I4,I10,I8,I6)
         CALL ENCODE(LOGREC,132)
         WRITE(31,500)(IALPHA(NOSUB,K),K=1,40), IDST(NOSUB),
     +   ICLASS(NOSUB),IMONTH(NOSUB),IDAY(NOSUB),IGROUP(NOSUB),
     +   IUNIT(NOSUB)
 500     FORMAT(22A6/17A6,A4,I6,I2,I2,I2,I1,I10,3X)
         CALL NTRAN(8,1,44,LOGREC,LSTAT)
 310     IF(LSTAT.EQ.-1)GOTO 310
C        GO TO WRITE THE LSTAT WRITE ERRORS
         IF(LSTAT.EQ.-2)GOTO 610
         IF(LSTAT.LE.-3) GOTO 90
 300     CONTINUE
C  IF THIS WAS THE LAST CLASS ON THE TAPE, EXIT THE PROGRAM.
C  OTHERWISE, STORE ALL DATA FROM THE RECORD LAST READ(I.E.
C  THE FIRST RECORD OF THE NEW CLASS) INTO THE NUMBER ONE POSITION
C  OF THE NEXT BATCH TO BE READ AND SORTED.
      IF(NOMORE.EQ.1)GOTO 9
      DO 510 K=1,40
 510  IALPHA(1,K)=IALPHA(KOUNT2,K)
      IDST(1)=IDST(KOUNT2)
      ICLASS(1)=ICLASS(KOUNT2)
      IMONTH(1)=IMONTH(KOUNT2)
      IDAY(1)=IDAY(KOUNT2)
      IGROUP(1)=IGROUP(KOUNT2)
      IUNIT(1)=IUNIT(KOUNT2)
      IMDG(1)=IMONTH(KOUNT2)*1000+IDAY(KOUNT2)*10+IGROUP(KOUNT2)
      KEY(1)=1
      IOLDST=IDST(1)
      IOLDCL=ICLASS(1)
      INIT=2
      GO TO 40
 101  WRITE(6,111)
 111  FORMAT('1',20X,'END OF FILE')
      NOMORE=1
      GO TO 400
 610  WRITE(6,620)
 620  FORMAT(' END OF TAPE ENCOUNTERED IN WRITE SEQUENCE')
      GOTO 9
  90  WRITE(6,91)
  91  FORMAT(' WRITE ERROR I.E.....')
 102  WRITE(6,112)IDST(KOUNT2-1),IOLDCL,IGROUP(KOUNT2-1),
     +IMONTH(KOUNT2-1),IDAY(KOUNT2-1),LSTAT
 112  FORMAT(' ERRORS IN TAPE OR TRANSMISSION ON RECORD ID NUMBER
     +(DSTCGMD)=', I6,I2,I1,I2,I2,'LSTAT=',I4)
   9  END FILE 8
      REWIND 8
      STOP
      END
```

SUBROUTINE SORT

1.0 - PROGRAM IDENTIFICATION

SUBROUTINE SORT (SORTON, FOLLOW, NRECS)

2.0 - OBJECTIVE

Sort an array of record ID numbers into ascending order and concurrently move their corresponding index values (initially in order of 1, 2, . . . NRECS).

3.0 - PROGRAM DESCRIPTION

3.1 - Program Logic

SUBROUTINE SORT is passed, 1) SORTON, an array of unsorted record ID numbers, 2) FOLLOW, an index array containing numbers (1, 2, . . . NRECS) corresponding to each record ID number, and 3) NRECS, the number of elements contained in each of those arrays. In the rare event that only one index value is passed, SUBROUTINE SORT bypasses any sorting activity and returns to the main program. Otherwise, an ascending bubble sort is applied. The outer loop is entered and its DO variable is set to indicate the first of a complete pass through record ID array SORTON and index array FOLLOW. Similarly, the inner loop is entered and its DO variable is set to indicate the first comparison made between two elements within the record ID array: If those two elements are out of order with respect to one another, each is shifted to the other's position, as are their corresponding FOLLOW values. Comparisons continue with the last element in the last comparison compared with the element succeeding it until all elements within the array have been compared with their neighbors. Should all comparisons within a pass yield no out-of-orders, both arrays are returned to the main program in their new sorted order. Otherwise, the outer loop is again entered to begin another complete pass through the arrays.

3.2 - Variables

All variables are of integer type

FOLLOW(NRECS) FOLLOW the SORTON elements. This array enters the subroutine, containing numbers 1, 2, 3, . . . NRECS, in that order. As out-of-order record ID's are shifted into order, their corresponding elements in the FOLLOW array are also shifted. FOLLOW is

finally returned with its elements rearranged, and is used by the main program to fetch and write the records in their new, sorted order.

FTEMP, FOLLOW TEMPORARY. This value serves as the temporary storage location for an element within the FOLLOW array during the operation in which that element is shifted in position with a neighboring element.

KMPARE, KOMPARE. This DO variable of the comparison loop appears in the arithmetic expression for the subscript of the two array elements being compared.

MORE, MORE PASSES. This flag contains a value of either 1 or 0 to indicate whether more passes through the record ID array are required to finish the sort.

NPASS, NUMBER OF THE PASS. This DO variable indicates the number of times the record ID array has been completely stepped through. If only one record ID is passed to SUBROUTINE SORT, NPASS is set to zero, sort operations are bypassed, and the single record ID value and corresponding FOLLOW value, are immediately returned to the main program.

NRECS, NUMBER OF RECORDS. As the third argument in the subroutine list, this value indicates the number of record ID's to be sorted.

SORTON(NRECS), SORT ON this array. The record identification numbers within this array are examined with respect to their order (i.e., relative to their immediate neighbors) within this array so as to trigger sort operations necessary to rearrange them in ascending order.

STEMP, SORTON TEMPORARY. STEMP serves as the temporary storage location for an element within the SORTON array during the operation in which that element is shifted in position with a neighboring element.

4.0 - SUBROUTINES AND FUNCTIONS

None

5.0 - DATA SPECIFICATIONS

Not Applicable

6.0 - PROGRAM CONSTRAINTS AND LIMITATIONS

6.1 - Programming Language

Univac 1108 FORTRAN V

6.2 - Vendor

University Computing Company

6.3 - Storage Requirements

176 octal words

6.4 - Hardware Configuration

Not applicable

6.5 - Program Parameters

The number of elements contained in either array should not exceed 240 unless array dimensions and loop limits are expanded beforehand.

6.6 - Error Messages

None

7.0 - OPERATING INSTRUCTIONS

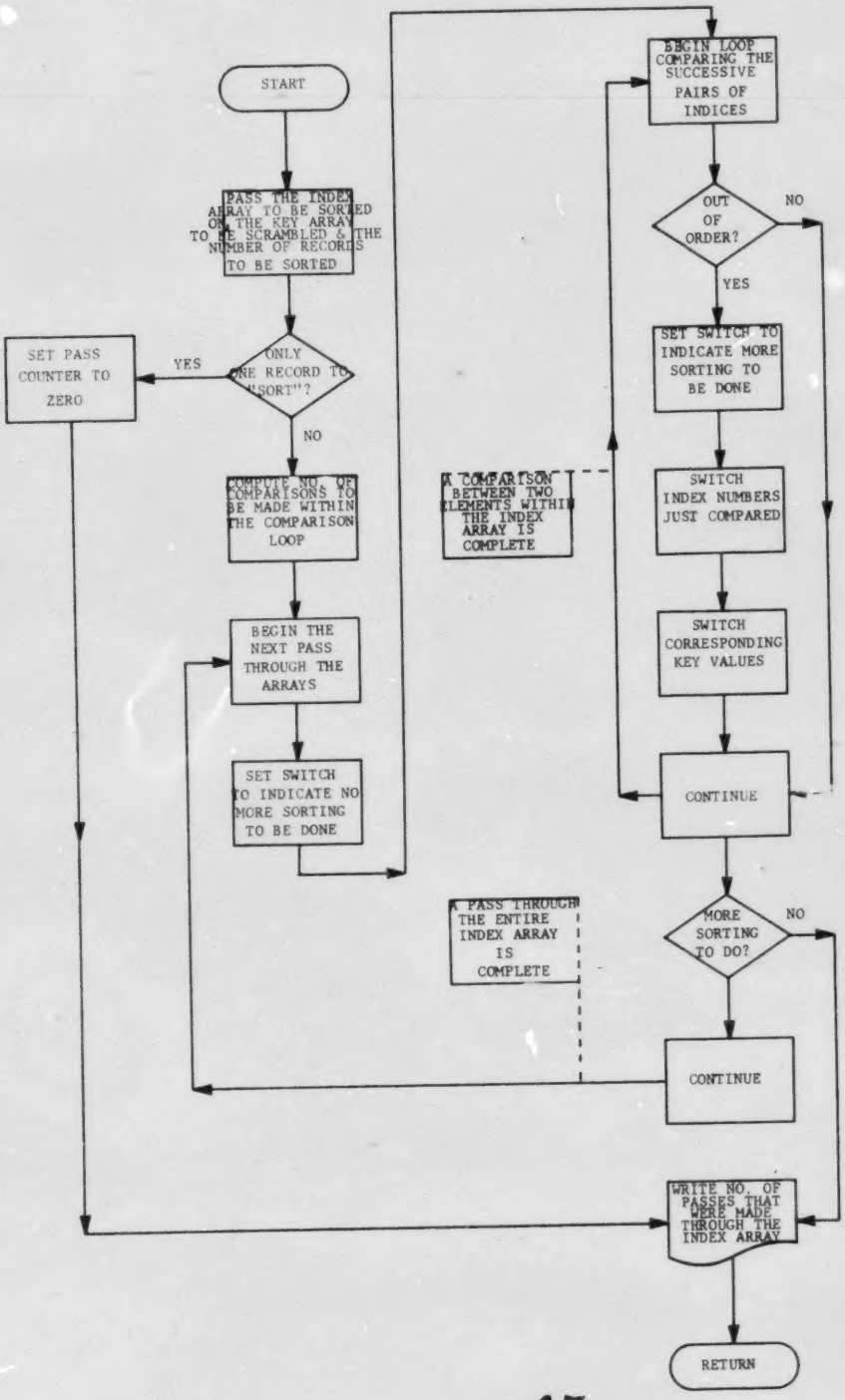
Executed under main program control.

8.0 - PROGRAM FLOWCHART

SWRI

FLOWCHART LAYOUT FORM

PROGRAMMER: Tom Foote
PROGRAM ID: Subroutine Sort
DATE: ___ ___ ___
PAGE 1 OF 1


START
PASS THE INDEX ARRAY TO BE SORTED OR THE KEY ARRAY TO BE SCRAMBLED & THE NUMBER OF RECORDS TO BE SORTED
ONLY ONE RECORD TO "SORT"?
YES
SET PASS COUNTER TO ZERO
NO
COMPUTE NO. OF COMPARISONS TO BE MADE WITHIN THE COMPARISON LOOP
BEGIN THE NEXT PASS THROUGH THE ARRAYS
SET SWITCH TO INDICATE NO MORE SORTING TO BE DONE
BEGIN LOOP COMPARING THE SUCCESSIVE PAIRS OF INDICES
OUT OF ORDER?
NO
YES
SET SWITCH TO INDICATE MORE SORTING TO BE DONE
SWITCH INDEX NUMBERS JUST COMPARED
SWITCH CORRESPONDING KEY VALUES
CONTINUE
A COMPARISON BETWEEN TWO ELEMENTS WITHIN THE INDEX ARRAY IS COMPLETE
A PASS THROUGH THE ENTIRE INDEX ARRAY IS COMPLETE
MORE SORTING TO DO?
NO
CONTINUE
WRITE NO. OF PASSES THAT WERE MADE THROUGH THE INDEX ARRAY
RETURN

9.0 - PROGRAM LISTING

```
C   THE FOLLOWING SUBROUTINE SORTS THE ARRAY "SORTON,"(SMALLEST
C   VALUE FIRST,GREATEST LAST)WHILE CORRESPONDINGLY REARRANGING THE
C   KEY ARRAY "FOLLOW." NRECS IS THE TOTAL NUMBER OF ELEMENTS TO BE
C   SORTED.
      SUBROUTINE SORT(SORTON,FOLLOW,NRECS)
      INTEGER SORTON,FOLLOW,STEMP,FTEMP
      DIMENSION SORTON(240),FOLLOW(240)
C     IF ONLY ONE RECORD IS PASSED TO THE SUBROUTINE, SET
C     NPASS EQUAL TO ZERO, WRITE "NPASS=0", AND RETURN
C     TO THE MAIN PROGRAM.
      IF(NRECS.GT.1)GOTO 10
      NPASS=0
      GO TO 22
   10 LESONE=NRECS-1
C     NPASS IS INCREMENTED EACH TIME A PASS THROUGH THE ENTIRE
C     "SORTON" ARRAY IS TO BE MADE.
        DO 21 NPASS=1,NRECS
C       TURN THE "MORE" SWITCH OFF TO INDICATE THAT NO MORE PASSES
C       ARE REQUIRED TO FINISH THE SORT.
        MORE=0
C       KMPARE IS INCREMENTED EACH TIME A NEW ELEMENT WITHIN THE
C       "SORTON" ARRAY IS TO BE COMPARED WITH THE ELEMENT IMMEDIATELY
C       PRECEEDING IT.
          DO 20 KMPARE=1,LESONE
          IF(SORTON(NRECS-KMPARE+1).GE.SORTON(NRECS-KMPARE)) GO TO 20
C         TURN THE "MORE" SWITCH ON TO INDICATE THAT MORE PASSES
C         ARE REQUIRED TO FINISH THE SORT.
          MORE=1
C         SWITCH THE TWO "SORTON" VALUES THAT WERE OUT OF ORDER.
          STEMP=SORTON(NRECS-KMPARE)
          SORTON(NRECS-KMPARE)=SORTON(NRECS-KMPARE+1)
          SORTON(NRECS-KMPARE+1)=STEMP
C         SWITCH THEIR CORRESPONDING "FOLLOW" VALUES.
          FTEMP=FOLLOW(NRECS-KMPARE)
          FOLLOW(NRECS-KMPARE)=FOLLOW(NRECS+1-KMPARE)
          FOLLOW(NRECS+1-KMPARE)=FTEMP
   20     CONTINUE
C         IF MORE PASSES ARE REQUIRED TO FINISH THE SORT, PASS THROUGH
C       THE ENTIRE "SORTON" ARRAY ONCE AGAIN. OTHERWISE RETURN
C       TO THE MAIN PROGRAM.
        IF(MORE.EQ.1) GO TO 21
        GO TO 22
   21   CONTINUE
C     WRITE THE NUMBER OF PASSES IT REQUIRED TO COMPLETE THIS SORT.
   22 WRITE(6,30) NPASS
   30 FORMAT(' NPASS=',I5)
      RETURN
      END
```

APPENDIX A

WEEKLY LOG: COMMUNICATIONS SKILLS PROGRAM

SCHOOL DISTRICT: 1 5 | SCHOOL: 2 6 | TEACHER: 3 4 7 | CLASS: 4 | PROG: 8

MONTH: 9 | DAY:

8th "Grid" of "Field" 5.

Field numbers correspond to subscripts of the IALPHA array. The grid marked within each field is scanner coded to an alpha character (usually first grid coded to "A," second grid to "B," and so on), which is in turn stored by the WLSORT program into the IALPHA array.

IS THE CLASS GROUPED YES 12 NO IF YES, MARK GROUP NUMBER FOR THIS SHEET 1 2 3 4

INITIAL INSTRUCTION

DAY	UNIT	INSTRUCTIONAL TIME	CLERICAL TIME
MONDAY	14	15	16
TUESDAY	17	18	19
WEDNESDAY	20	21	22
THURSDAY	23	24	25
FRIDAY	26	27	28

MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY	
Skill or Activity	Daily Assessment Passed	Skill or Activity	Daily Assessment Passed	Skill or Activity	Daily Assessment Passed	Skill or Activity	Daily Assessment Passed	Skill or Activity	Daily Assessment Passed
29	Y 30 A	31	Y N 32	33	Y 34 A	35	Y 36 A	37	Y 38 A
39	Y 40 A	41	Y N 42	43	Y 44 A	45	Y 46 A	47	Y 48 A
49	Y 50 A	51	Y N 52	53	Y 54 A	55	Y 56 A	57	Y 58 A
59	Y 60 A	61	Y N 62	63	Y 64 A	65	Y 66 A	67	Y 68 A
69	Y 70 A	71	Y N 72	73	Y 74 A	75	Y 76 A	77	Y 78 A
79	Y 80 A	81	Y N 82	83	Y 84 A	85	Y 86 A	87	Y 88 A
89	Y 90 A	91	Y N 92	93	Y 94 A	95	Y 96 A	97	Y 98 A
99	Y 100 A	101	Y N 102	103	Y 104 A	105	Y 106 A	107	Y 108 A
109	Y 110 A	111	Y N 112	113	Y 114 A	115	Y 116 A	117	Y 118 A
119	Y 120 A	121	Y N 122	123	Y 124 A	125	Y 126 A	127	Y 128 A
129	Y 130 A	131	Y N 132	133	Y 134 A	135	Y 136 A	137	Y 138 A
139	Y 140 A	141	Y N 142	143	Y 144 A	145	Y 146 A	147	Y 148 A
149	Y 150 A	151	Y N 152	153	Y 154 A	155	Y 156 A	157	Y 158 A
159	Y 160 A	161	Y N 162	163	Y 164 A	165	Y 166 A	167	Y 168 A
169	Y 170 A	171	Y N 172	173	Y 174 A	175	Y 176 A	177	Y 178 A

SECOND INSTRUCTION

DAY	UNIT	INSTRUCTIONAL TIME	CLERICAL TIME
MONDAY	179	180	181
TUESDAY	182	183	184
WEDNESDAY	185	186	187
THURSDAY	188	189	190
FRIDAY	191	192	193

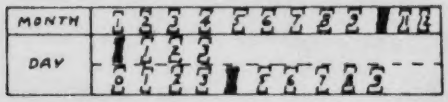
	OUTCOME 1		OUTCOME 2		OUTCOME 3		OUTCOME 4		Criterion Exercise Retest
	Practice Exercise A	OTHER	Practice Exercise B	OTHER	Practice Exercise C	OTHER	Practice Exercise D	OTHER	
MONDAY	194	195	196	197	198	199	200	201	202
TUESDAY	203	204	205	206	207	208	209	210	211
WEDNESDAY	212	213	214	215	216	217	218	219	220
THURSDAY	221	222	223	224	225	226	227	228	229
FRIDAY	230	231	232	233	234	235	236	237	238

At the end of every week send the completed form to the District Program Supervisor.

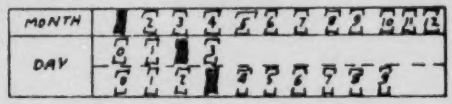
AT THE TOP INDICATE:

1. Date of the last school day of the week.
   a. Month: Blacken the rectangle around the appropriate number.
   b. Day: Blacken the appropriate retangle in both rows. If the date is 1 through 9, blacken the zero in the first row and the appropriate rectangle in the second row.

Examples



October 4



January 23

FOR EACH DAY INDICATE:*

1. The sequence number of the book you are using by blackening the appropriate rectangle under one of these series names:
   RRS (Reading Readiness Series)
   PPS (Pre-Primer Series)
   PS (Primer Series)
   FRS (First Reader Series)

2. Whether a test was given. If yes, blacken the "Y" rectangle. If no, blacken the "N" rectangle.

3. Time spent on program in
   a. Initial instruction: Blacken an "I" rectangle under one of the time ranges. If no time was spent, do not make a mark.
   b. Review: Blacken an "R" rectangle under one of the time ranges. If no time was spent, do not make a mark.

AT THE END OF THE WEEK INDICATE:

1. Last page completed in the text that week: Blacken the appropriate numbers in the three rows. If the page number is less than 10, blacken the zeroes in the top two rows and the appropriate number in the bottom row. If the page number is between 10 and 99, blacken the zero in the top row and the appropriate numbers in the bottom two rows.

---

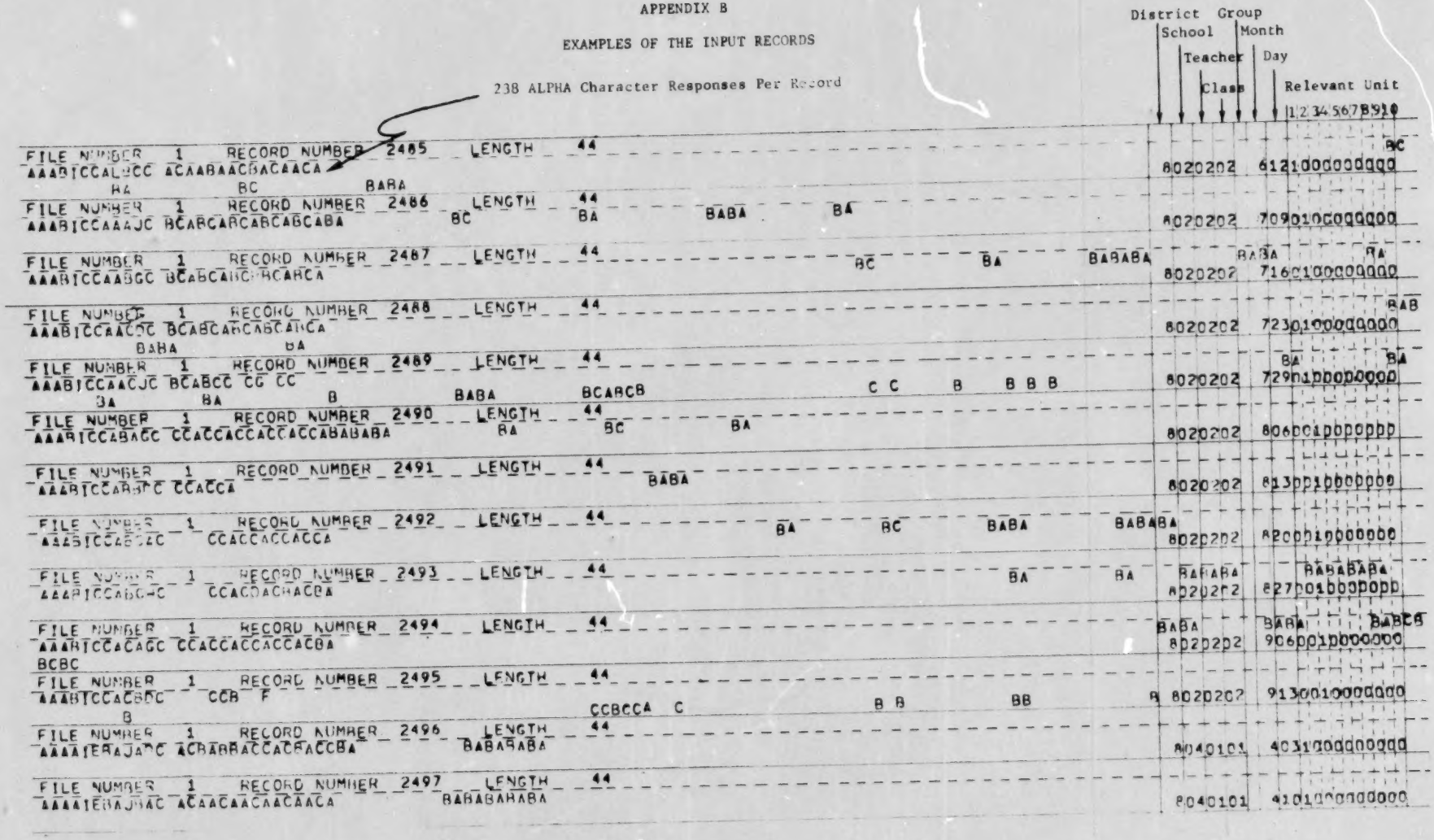
* If the class is grouped, follow remainder of the directions, <u>once for each group</u>, under the headings Group 1, Group 2, etc.

UTILITY FORM 5867 OPTICAL SCANNING CORPORATION

APPENDIX B

EXAMPLES OF THE INPUT RECORDS

238 ALPHA Character Responses Per Record


District
Group
School
Month
Teacher
Day
Class
Relevant Unit
1 2 3 4 5 6 7 8 9 10
FILE NUMBER 1 RECORD NUMBER 2485 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2486 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2487 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2488 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2489 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2490 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2491 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2492 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2493 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2494 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2495 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2496 LENGTH 44
FILE NUMBER 1 RECORD NUMBER 2497 LENGTH 44

APPENDIX C

EXAMPLES OF THE OUTPUT RECORDS

238 ALPHA Character Responses Per Record

District Month
School Day
Teacher Group
Class Relevant Unit
1 2 3 4 5 6 7 8 9 10

```
FILE NUMBER  1   RECORD NUMBER  60   LENGTH  44
BAABDBBABBDC IFCIFBIFCIGCIFD                                        BA
BA      BA      BC      BA      BC                                  BC      BABC
                                                                    1 3 0 1 0 1  2  8 1 3 0          1 2

FILE NUMBER  1   RECORD NUMBER  61   LENGTH  44
BAABDBBABCAC JGCJFBJEBJGCJGBBC      BA      BABC      BA      BABC      BC      BA
                                                                    1 3 0 1 0 1  2  8 2 0 0          1

FILE NUMBER  1   RECORD NUMBER  62   LENGTH  44
BAARDBBABCHC JGCJHCJEC                                              BC      BC
BC                                                                  BA
                                                                    1 3 0 1 0 1  2  8 2 7 0          1

FILE NUMBER  1   RECORD NUMBER  63   LENGTH  44
BAAADBCAICGC ACBADBADAADBADG      BB      BC      BBBCBC
                                                                    1 3 0 1 0 2  1  3 2 6 0 1 0 0 0 0 0 0 0

FILE NUMBER  1   RECORD NUMBER  64   LENGTH  44
BAAADBCAJADC AD AHCACBAGCAGA                    BC      BC      BA      BBBB
                                                                    1 3 0 1 0 2  1  4 3 0 1 0 0 0 0 0 0 0

FILE NUMBER  1   RECORD NUMBER  65   LENGTH  44
BAAADBCAJAJC ACBAGBAC ACA
   BA      BC      BABCBC
                                                                    1 3 0 1 0 2  1  4 9 0 1 0 0 0 0 0 0 0

FILE NUMBER  1   RECORD NUMBER  66   LENGTH  44
BAAADBCAJBHC AC    AFC
                BC      BC              AE AE                   B       B
                                                                    1 3 0 1 0 2  1  4 1 7 0 1 0 0 0 0 0 0 0

FILE NUMBER  1   RECORD NUMBER  67   LENGTH  44
BAAADBCAJCEC          CBGAB A      BA      BC          BB
                                  BC    AD AD    D      A A          B B          A
                                                                    1 3 0 1 0 2  1  4 2 4 0 1 1 0 0 0 0 0 0

FILE NUMBER  1   RECORD NUMBER  68   LENGTH  44
BAAADBCAJDBC BG BGBBGBBGBBGA                        BABC      BA      BC      BA      BA
                                                                    1 3 0 1 0 2  1  4 3 1 0  1 0 0 0 0 0 0 0

FILE NUMBER  1   RECORD NUMBER  69   LENGTH  44
BAAADBCAKAHC BFBBFBBGBBF BGB                                                        BA
BABC            BA                                                  BA
                                                                    1 3 0 1 0 2  1  5  7 0  1 0 0 0 0 0 0 0

FILE NUMBER  1   RECORD NUMBER  70   LENGTH  44
BAAADBCAKBEC B  BCFCHBCGACFA    BA      BBBA      BC
                BA              BC              BC BC BC                    AB          AC          BC
                                                                    1 3 0 1 0 2  1  5 1 4 0  1 1 0 0 0 0 0 0

FILE NUMBER  1   RECORD NUMBER  71   LENGTH  44
BAAADBCAKCBC C BCCACE CFBCGB                        BA      BA      BC      BBBB
                                        BE BC BDD       BC      BC      B
                                                                    1 3 0 1 0 2  1  5 2 1 0  1 1 0 0 0 0 0 0

FILE NUMBER  1   RECORD NUMBER  72   LENGTH  44
BAAADHCAKCGC CEACHACH                                               BA      BA
                                                                    1 3 0 1 0 2  1  5 2 6 0  1 0 0 0 0 0 0 0
```